

姜玉航, 罗勇, 牛贺才, 郭双龙, 李宁波. 2013. 中条山落家河铜矿流体包裹体初步研究. 岩石学报, 29(7): 2583-2592

中条山落家河铜矿流体包裹体初步研究

作者	单位	E-mail
姜玉航	中国科学院广州地球化学研究所矿物学与成矿学重点实验室, 广州 510640; 中国科学院大学, 北京 100049	
罗勇	南阳师范学院环境科学与旅游学院, 南阳 473061	
牛贺才	中国科学院广州地球化学研究所矿物学与成矿学重点实验室, 广州 510640	niuhc@gig.ac.cn
郭双龙	中条山有色金属集团有限公司, 垣曲 043700	
李宁波	中国科学院广州地球化学研究所矿物学与成矿学重点实验室, 广州 510640; 中国科学院大学, 北京 100049	

基金项目: 本文受国家973项目(2012CB416603)资助.

摘要:

落家河铜矿位于中条裂谷东南部的构造-剥蚀天窗内, 矿体赋存于中元古界西阳河群安山岩覆盖区下部的宋家山组沉积-火山变质岩系中。本文重点研究了不同空间位置与矿体共生的石英脉中的流体包裹体, 以探讨落家河铜矿的成矿流体特征和成矿机制。系统的包裹体岩相学观察表明, 落家河铜矿床流体包裹体类型按相态主要分为纯气相包裹体(I型)、纯液相包裹体(II型)、富气相的气液两相包裹体(III型)、富液相的气液两相包裹体(IV型)和含子矿物多相包裹体(V型)五种类型。矿体上部石英脉中主要为II型和IV型包裹体, 矿体下部石英脉中主要为V型和I型包裹体, 且两种包裹体紧密共存, 体现了沸腾包裹体组合的特征。显微测温结果显示, 原生的富液相气液两相包裹体(IVa型)具有CaCl₂-NaCl-H₂O体系(IVa1型)和NaCl-H₂O体系(IVa2型)两种流体体系, 其均一温度分别为100~208℃和151~306℃, 盐度为10.2%~20.4% NaCl_{eqv}和3.4%~15.1% NaCl_{eqv}, 分别对应矿体上部和下部石英脉, 显示出热卤水和岩浆热液两种不同的流体来源。V型包裹体的均一温度为175~300℃, 盐度达30.7%~38.2% NaCl_{eqv}。研究结果显示, 热卤水和岩浆热液的流体作用机制有所不同, 前者是古海水在花岗岩侵入体的驱动下形成对流循环并从火山岩中萃取金属元素形成的含矿热卤水。热卤水在沿断裂通道上升过程中由于降温、减压使成矿物质沉淀; 后者主要是从岩浆中分离出的中温中盐度流体, 它在到达断裂通道时由于压力骤降发生流体沸腾作用, 并产生矿质沉淀。激光拉曼探针分析显示, 流体包裹体气相成分主要是水, 含有少量CO₂。结合矿床形成的构造背景、热液通道、驱动机制和成矿流体特征, 作者认为落家河铜矿可能是一个前寒武纪海相火山成因块状硫化物矿床。

英文摘要:

Luojiahe copper deposit is located in the Luojiahe tectonic-erosion window, southeastern of Zhongtiao rift. Cu-mineralization occurs in the metamorphic volcanic-sediments of the Songjiashan Formation which is covered by Mesoproterozoic andesitic rocks of the Xiyanghe Group. This paper focuses on the study of fluid inclusions in ore-bearing quartz veins which are intergrowth with ore-body, to discuss the features of ore-forming fluids and the implications for Cu-mineralization. Based on systematically petrographic observation, fluid inclusions are classified into five types by phases: Pure vapor inclusions (I-type), pure aqueous inclusions (II-type), vapor-rich inclusions (III-type), aqueous-rich inclusions (IV-type) and daughter mineral-bearing inclusions (V-type). II-type and IV-type inclusions are dominant in the upper orebody, and I-type and V-type inclusions are dominant in the lower orebody. The coexistence of V-type with I-type inclusions shows the features of boiling assemblage. Microthermometry data indicates that there are two different systems of CaCl₂-NaCl-H₂O system (IVa1-type) and NaCl-H₂O system (IVa2-type) in the liquid-rich aqueous inclusions (IVa types), corresponding to the upper quartz veins and the lower quartz veins. Both homogenization temperature (T_h) and salinity of the two types are different, indicating that the ore-forming fluids might originate from two different fluid sources. The T_h of IVa1-type range from 100℃ to 208℃ and salinities range from 10.24% to 20.45% NaCl_{eqv}. It is suggest that the fluid of IVa1-type is hot brine derived from sea water. In contrary, the IVa2-type is from magmatic fluid, with T_h of 151~306℃ and salinities of 3.39%~15.07% NaCl_{eqv}, respectively. T_h and salinities of the V-type inclusions are in range of 175~300℃ and 30.7%~38.16% NaCl_{eqv}. In this regards, we can infer that hot brine and magmatic fluids have different influences to Cu-mineralization. The former extracted metal elements from volcanic rocks, and then precipitated when loss of temperature and pressure. The later released metal elements by phase separation. Laser-Raman microspectroscopy analyses show that the vapour phase of the fluid inclusions is composed of H₂O and a few CO₂. Regarding the regional tectonic setting, fluids channel, mechanism and the features of ore-forming fluids, we conclude that the Luojiahe Cu deposit is a volcanic-associated massive sulfide deposit of Precambrian.

关键词: [流体包裹体](#) [落家河铜矿](#) [流体来源](#) [对流循环](#) [沸腾作用](#)

投稿时间: 2013-02-13 最后修改时间: 2013-05-30

黔ICP备07002071号-2

主办单位：中国矿物岩石地球化学学会

单位地址：北京9825信箱/北京朝阳区北土城西路19号

本系统由北京勤云科技发展有限公司设计

